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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,425	01/07/2005	Michael Stewart Griffith	033963-014	5697

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EXAMINER	
DOAK, JENNIFER L	

ART UNIT	PAPER NUMBER
2872	

NOTIFICATION DATE	DELIVERY MODE
04/30/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

Office Action Summary	Application No.	Applicant(s)	
	10/520,425	GRIFFITH ET AL.	
	Examiner	Art Unit	
	Jennifer L. Doak	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-23,25-28 and 31-38* is/are pending in the application.

4a) Of the above claim(s) *3,16-23 and 26-28* is/are withdrawn from consideration.

5)☒ Claim(s) *8* is/are allowed.

6)☒ Claim(s) *1,2,5-7,9-15,25 and 31-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/9/09 has been entered.

Specification

The title of the invention is not descriptive. "The title should be brief but technically accurate and descriptive and should contain fewer than 500 characters," MPEP §606. Specifically, statements concerning the general type or nature of the entire system or its components that are common to many other similar elements or systems that are known in the art are not sufficiently descriptive to provide "informative value in indexing, classifying, searching, etc.," MPEP §606.01. Examiner recommends directing the title to what Applicant believes is the point of novelty, since it is by the novelty that "indexing, classifying, searching, etc." is generally accomplished. Nevertheless, it should be noted that, pursuant to MPEP §606.01, "[i]f a satisfactory title is not supplied by the applicant, the examiner may, at the time of allowance, change the title by examiner's amendment."

Applicant's amendment is noted, but is still found insufficient. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 5, 6, 9-15, 25, and 31-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plante (US 4655563) in view of Clemino (US 4670338) in further view of Fuschetto (US 4226507).

Regarding claims 1, 6, and 38, Examiner makes the following findings of fact: Plante discloses a mirror structure comprising: a self-deforming mirror (Fig. 3: 10, 14; col. 2, ln. 68-col. 3, ln. 2; i.e., this includes the morphing layer bonded to a substrate as in claim 38) mounted on a passive flexible support structure (16, epoxy as at col. 5, lns 37-43) the support structure comprising, one or more passive support elements (16) arranged to provide a supporting surface on which the self-deforming mirror is mounted (Figs. 1 and 3)), wherein the support structure is arranged to enable a deformation response in the self-deforming mirror mounted thereon (Title); and the option of using epoxy to affix element 16 (col. 3, lns 18-22).

Plante does not explicitly disclose that the supports are "flexible" or "compliant", or that the mirror has a piezoelectric actuator bonded to the mirror substrate, that the passive support is attached to the piezoelectric actuator. Plante and Clemino are related as mirrors. Clemino discloses the flexibility resulting from an epoxy type glue (col. 5, lns 37-43), therefore imparting flexibility to element 16. Such a material enables the absorption of stresses or reduction of deformation (col. 7, lns 43-50).

Therefore, Examiner finds that it would have been obvious to an ordinarily skilled artisan at the time of invention to use a flexible epoxy adhesive as taught by Clemino as the epoxy disclosed by Plante in order to enable the absorption of stresses or reduction of deformation.

Examiner makes the following further findings of fact: the Plante-Clemino combination does not disclose that the mirror has a piezoelectric actuator bonded to the mirror substrate, that the passive support is attached to the piezoelectric actuator. The Plante-Clemino combination is related to Fuschetto as deformable mirrors. Fuschetto teaches that the mirror (part of 19; col. 2, lns. 28-46) has a piezoelectric actuator (e.g., 13, 15, 17) bonded to the mirror substrate, that the

passive support is attached to the piezoelectric actuator (12). The benefits of Fuschetto include the ability to be all in the same plane and forces can be applied in the one plane; focusing; third-order astigmatism correction, and mechanically simple arrangement (col. 1, lns. 46-62).

Therefore, Examiner concludes that it would have been obvious to an ordinarily skilled artisan at the time of invention to use the piezoelectric actuator of Fuschetto in the deformable mirror of the Plante-Clemino combination since the benefits include astigmatism correction, planar force manipulation, and simple mechanical arrangement.

Regarding claims 2, 5, 9, the combination further discloses the plurality of passive flexible support elements (Plante, Fig. 1: 16) are spatially arranged to support the self-deforming mirror from below (Fig. 1), with each of the support elements having an end shaped for providing support to the self-deforming mirror (Figs. 1, 3: 10) and a flexible portion that connects the supporting end of the support element to a body portion (20) of the support structure; wherein each of the support elements is positioned so as to be in supportive contact with a different electrode (34) of the self-deforming mirror mounted thereon (note that electrodes 34 are necessarily formed on the surface); the support elements are formed as integral parts of the body portion of the support structure (note that integral is sufficiently broad so as to encompass the joined structures shown in Plante).

Regarding claims 10-12 and 15, the combination does not explicitly disclose that the compliance of compliant material selected to form at least a portion of each of the support elements varies according to an established position of the support element in the support structure; the distance of the respective support element from the edge of a supported mirror

substrate; the position of the support element in the support structure; varying the compliance of the compliant material used to form the support element. However, these variances are seen as inherent in the combination. With respect to compliance in relation to positioning of the support elements (including near the edge and within the support structure), since Plante it is disclosed that Plante is a deformable mirror, it is noted that different locations on or within the mirror structure would have varying stresses on the support structures relative to the deformation, and it is apparent that these stresses would result in varying compliance, which therefore must be present for the device to function as intended.

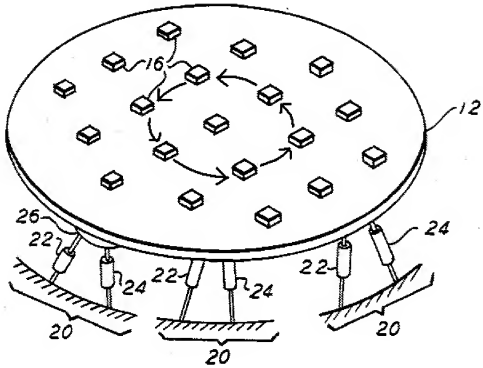
Regarding claims 13 and 14, the combination does not explicitly disclose that the compliance of compliant material selected to form at least a portion of each of the support elements varies according to the length of the support element; the cross-sectional area of the support element. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller,* 105 USPQ 233 (C.C.P.A. 1955). Benefits of such optimization in this case can include reduced distortion, increased life expectancy of the mirror system, or better image quality.

Therefore, Examiner finds that it would have been obvious to an ordinarily skilled artisan at the time of invention to optimize the ranges of length and cross-sectional areas of the support elements to reduce distortion, increase life of the mirror system, or improve image quality.

Regarding claim 25, the combination further discloses a reflective surface (Plante, Fig. 1: 14) provided on a substrate (10) and a layer of deformable material (i.e., epoxy) attached to the substrate that is operable to deform the mirror.

Regarding claims 31-33, the combination further discloses that required deformation response for the self-deforming mirror includes a resonant frequency (Plante, col. 1, lns. 41-43) for the self-deforming mirror mounted on the support structure; a required deformation response for the self-deforming mirror includes a required stroke characteristics (e.g., col. 2, lns. 9-18; col. 5, lns. 30-42) for the self-deforming mirror mounted on the support structure; wherein the self-deforming mirror is a bimorph (see above: having both bandwidth, which is related to frequency, and stroke, which is displacement) self-deforming mirror having at least one layer of deformable material (14, 10).

Regarding claim 34, the combination further discloses at least some of the support elements are disposed in equi-spaced relationships in a circular arrangement (Plante, Fig. 1 as reproduced below and marked by Examiner for demonstration purposes), each positioned so as to be in contact with one or more mirror electrodes (34) when in use.



Reproduced from Plante, US 4655563, Fig. 1.

Examiner <u>added</u> directional indicators for circular, equi-distant relationship explication only.

Regarding claim 35, the combination further discloses the electrode includes a common electrode (33) disposed between the mirror substrate and the piezoelectric element.

Regarding claims 36 and 37, the combination further discloses an array of electrodes (33) that are disposed on a lower surface of the piezoelectric element (col. 3, lns. 37-47). The combination does not explicitly disclose that the common electrode step is disposed on an upper surface of the piezoelectric element. discloses the array of electrodes is disposed between the piezoelectric element and the one or more passive flexible support elements. However, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.,* 193 USPQ 8 (1977). In this case, the benefits of

additional sensors include that with sensors attached to the mirror/substrate would allow measurement of the mirror surface for the purpose of maintaining a quality image. Placement between the piezoelectric elements and the mirror surface would protect the mirror surface from damage by the movement of the piezoelectric element.

Therefore, Examiner concludes that it would have been obvious to an ordinarily skilled artisan to duplicate the sensors from below to above so as to sense the position of the deformable mirror, so as to improve image quality and protect the mirror.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

Pursuant to the reasons set forth in an earlier Office Action, claim 8 is allowed.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer L. Doak whose telephone number is (571)272-9791. The examiner can normally be reached on Mon-Thurs: 7:30A-5:00P, Alt Fri: 7:30A-4:00P (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. L. D./
Examiner, Art Unit 2872

/Stephone B. Allen/
Supervisory Patent Examiner
Art Unit 2872